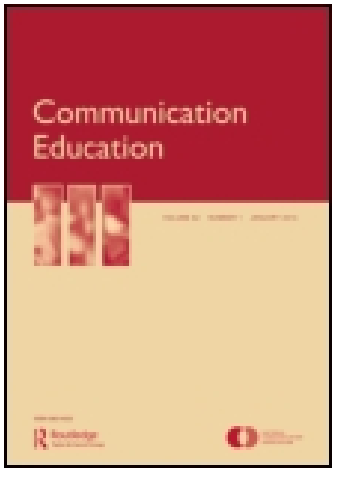

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Instructors' use of humor is generally a positive influence on student outcomes. However, examinations of humor have found that specific types of messages may not impact, or may even reverse, its positive effect. Instructional humor processing theory (IHPT) has been used to explain how humor impacts student learning. The current study sought to examine the tenets of this theory by testing whether the relationships articulated by its authors function the way the theory predicts they should. Three hundred participants responded to measures assessing their perceptions of affective learning, attention, self-determination, cognitive engagement, perceived cognitive learning, and instructors' humor. Results indicated that IHPT did not adequately explain the relationship between instructor humor and perceived cognitive learning. However, self-determination theory was a suitable alternative explanation.

Keywords: Humor; Self-Determination Theory; Elaboration; Affective Learning; Instructional Humor Processing Theory

As an effective teaching behavior, humor has been studied for some time (e.g., Garner, 2006; Gorham & Christophel, 1990; Hackathorn, Garczynski, Blankmeyer, Tennial, & Solomon, 2011; Wanzer & Frymier, 1999; Ziv, 1988). Defined as intentional messages that lead to laughter and amusement through incongruous meanings (Banas, Dunbar, Rodriguez, & Liu, 2011), humor is generally considered to be a positive influence in the classroom. This positive influence may stem from humor's ability to entertain students, alleviate anxiety related to the learning environment, create a positive academic climate, and increase both student motivation and learning (Banas et al., 2011). Moreover, researchers report that humor can increase perceptions of group cohesion, increase perceptions of immediacy, and create an

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enjoyable learning environment (for a review see Banas et al., 2011). Although these benefits reflect gains students might enjoy, humor is important for instructors as well. According to Banas et al. (2011), the use of humor in the classroom increases positive instructor evaluations, promotes persuasive teaching practices through the bolstering of students' affinity for instructors, boosts instructor credibility, and enhances student attention. In addition to these benefits, Houser, Cowan, and West (2007) note that humor is associated positively with students' perceptions of instructors' extroversion, sociability, and character.

Humor is not a unidimensional concept; instead, there are a variety of types that instructors may employ in their classrooms including: nonverbal humor, jokes, unplanned humor, self-disparaging humor, and aggressive humor (Banas et al., 2011). That said, not all humor is beneficial in academic settings. In fact, some humor may be considered detrimental. For instance, self-deprecating comments have been found to associate negatively with students' affect (e.g., Gorham & Christophel, 1990). Additionally, humor that is unrelated to classroom content or that is considered inappropriate (e.g., disparaging or offensive; Wanzer, Frymier, Wojtaszczyk, & Smith, 2006) has been shown to be unrelated to student learning (Wanzer, Frymier, & Irwin, 2010). Thus, though most research points to the notion that humor is generally beneficial in the classroom (Booth-Butterfield & Wanzer, 2010), some humor is not. That said, there are no clear conclusions regarding how humor "works" in an academic setting (Banas et al., 2011). Despite this lack of consensus, instructional humor processing theory (IHPT) has been advanced to help clarify the relationship between instructors' use of humor and student learning (Wanzer et al., 2010).

Proponents of IHPT hypothesize that appropriate and related classroom humor will influence student learning whereas inappropriate and unrelated humor will not (Wanzer et al., 2010). Borrowing from the tenets of the elaboration likelihood model (ELM; Petty & Cacioppo 1981, 1986b), Wanzer et al. (2010) state that learning is the result of appropriate humor's ability to create positive affect and related humor's ability to gain students' attention. As a result of increased positive affect and attention, Wanzer et al. suggest that students should experience greater motivation and ability to process course content in effortful ways. Ultimately, according to IHPT, it is effortful message processing that explains student learning.

Despite the addition of this theory to the literature, no studies have been conducted to verify the empirical associations between humor, affect, student attention, and cognitive elaboration asserted in IHPT. Thus, the purpose of the current study was to examine IHPT to test its assumptions. Moreover, another purpose of this study was to explore an alternative framework of self-determination theory as a competing perspective to explain the influence of humor and positive affect on student learning.

Instructional Humor Processing Theory

Wanzer et al. (2010) argue that the most important reason for instructors to use humor in the classroom is to enhance learning. However, as mentioned above, not all humor gets processed in the same fashion and, as a result, the use of humor may not

always lead to this desired outcome. According to Wanzer et al. (2010), humor gets processed and promotes student learning through a variety of steps. First, in order for humorous messages to influence student outcomes, students must recognize that humor has taken place. According to IHPT, students' recognition of humorous stimuli stems from incongruity in instructional messages that gets resolved and accurately interpreted. Without this step, the authors argue, it cannot be said that humor has occurred. Next, the authors borrow from ELM to state that the way humorous messages get processed should influence their impact on learning. Specifically, the authors claim that students who process messages centrally will elaborate on the information and consequently develop a greater understanding of course material and enjoy better retention of the subject matter (Wanzer et al., 2010). Thus, Wanzer et al. assert that in order for students to learn at an optimal level, humor in the classroom should facilitate increased effort toward issue relevant thinking (Petty & Cacioppo, 1986a).

Importantly, borrowing from ELM, Wanzer et al. (2010) argue that students' elaboration of instructional messages is facilitated through their enhanced motivation and ability to process messages in a thoughtful manner. The authors claim that if these two conditions are not met, students should not learn from instructors' humorous messages. As it pertains to these conditions, Wanzer et al. make specific predictions. For example, the authors predict that if students experience positive affect as a result of humorous messages, they should become motivated to elaborate on course information. On the other hand, the authors argue that if humor creates negative affect (e.g., through disparaging or offensive humor), students will not be motivated to centrally process messages and cognitive elaboration will not occur. Additionally, Wanzer et al. claim that if humor creates positive affect but distracts from course content, it will have a negative impact on students' ability to centrally process instructional messages. In contrast, and consistent with previous investigations of ELM (O'Keefe, 2002), the authors state that "instructional messages that gain students' attention ... enhance students' ability to process the content resulting in greater retention and learning" (Wanzer et al., 2010, p. 6). Thus, because humorous messages might distract students from instructional messages, the authors argue that humor must gain students' attention if it is to increase their likelihood of elaboration. In summary, according to IHPT, in order for learning to be enhanced, humorous messages must create positive affect and increase students' attention because doing so increases their motivation and ability to elaborate on instructional messages resulting in increased issue-relevant thinking and, ultimately, increased learning.

Results of various tests examining the basic tenets of IHPT seem to support some of the conclusions predicted by the theory. For example, some types of inappropriate humor (predicted to reduce affect and therefore motivation to process content elaborately) have been found to be unrelated to students' reports of learning (Wanzer et al., 2010). Moreover, related humor (posited to associate with students' ability to pay attention and therefore elaborate on message content) has been found to be related positively to students' reports of learning indicators (Wanzer et al., 2010). Importantly, based on their operationalization regarding the effects of humor,

it should be noted that Wanzer et al. (2010) consider the impact of humor on learning to be general in nature. For example, in their original formulation, the authors measured the influence of humor experienced throughout a course on students' general perceptions of cognitive learning. This interpretation of the impact of humor as a general influence in the classroom is consistent with views other authors promote on the subject (e.g., Banas et al., 2011; Gorham & Christophel, 1990; Ziv, 1988).

Although various ideas underlying the conceptualization of IHPT have been studied in the past, Wanzer et al. (2010) noted that "additional research is clearly needed to provide support for IHPT" (p. 12). This is especially the case considering researchers have yet to demonstrate that the variables included in the theory work in concert the way they are hypothesized. Thus, as an exploratory study, we sought to test a model of IHPT to examine if the relationships between instructor humor and student affect, attention, cognitive processing, and perceived cognitive learning exist as presented in the original formulation of the theory. To help guide our inquiry, the first hypothesis represented a full model of instructional humor processing theory to test predictions about instructor humor and student learning:

> H1: Instructor humor will influence perceived cognitive learning through its impact on students' affect and attention and, subsequently, cognitive elaboration.

Self-Determination Theory

Empirical evidence has made it clear that instructional humor is associated with students' positive affect (Wanzer & Frymier, 1999; Wanzer et al., 2010), attention (Banas et al., 2011), and learning (Wanzer et al., 2010; Ziv, 1988). However, because IHPT is new to the literature, it may be useful to explore its predictions in comparison with an established theory explaining educational attainment because "theory comparison is good scientific practice" (Preacher & Hayes, 2008, p. 881). That said, though IHPT suggests the mechanism underlying increased learning is an increase in systematic processing, it could be that the affect generated by humor influences learning in a different fashion. In this paper we explore if an alternative explanatory mechanism for the effect of humor and positive affect on learning may exist in the facilitation of self-determined students (Deci & Ryan, 2000).

According to Deci and Ryan's (1985) self-determination theory (SDT), human motivation is a function of psychological need fulfillment: specifically the fulfillment of individuals' innate needs for competence, autonomy, and relatedness (Ryan & Deci, 2002). As a minitheory within self-determination theory, the basic needs theory model predicts that the satisfaction of these specific needs is "necessary and sufficient for growth, integrity, and wellness" (Jang, Reeve, Ryan, & Kim, 2009, p. 645). Applied to an educational setting, the basic needs theory model suggests that "the psychological needs for autonomy, competence, and relatedness function as requisite nutriment for students' active engagement and positive school functioning" (Jang et al., p. 649). In support of this assertion, research has found that students who have

their needs fulfilled, and are therefore self-determined, are more likely to enjoy greater academic achievement compared with those who are not (Deci, Vallerand, Pelletier, & Ryan, 1991). Specifically, compared with students who are not, students who are self-determined are likely to experience a host of positive outcomes including higher grades (Fortier, Vallerand, & Guay, 1995) and more: academic achievement, classroom engagement, intrinsic motivation (Jang et al., 2009), academic persistence, and learning (for a review, see Guay, Ratelle, & Chanal, 2008).

Having introduced self-determination theory and the basic needs theory, we return to our argument that humor and the resulting positive affect influence students' learning through the promotion of their self-determination. This prediction is bolstered by the relationships we know to exist between students' affective learning (i.e., their favorable feelings toward a course and an instructor; McCroskey, Richmond, Plax, & Kearney, 1985) and their needs of competence, relatedness, and autonomy. First, competence refers to students' perceptions of their capability of doing well in class (Fortier et al., 1995) and has been defined as being good at specified behaviors and believing that one can accomplish tasks (Van den Broek, Vansteenkiste, De Witte, Soenens, & Lens, 2010). As it pertains to this aspect of self-determination theory, Williams and Niemiec (2012) suggested that positive affect may increase individuals' perceptions of their own capability by enhancing people's "resolve to overcome difficult experiences and/or their desire to sustain change" (p. 328). Other researchers have substantiated this conclusion insofar as positive affect has been shown to increase creativity, problem solving (Isen, Daubman, & Nowicki, 1987), goal setting, and perceived self-efficacy (Baron, 1990). Because of these effects, it may be the case that the positive affect experienced in students' affective learning (created by humor) functions as a positive influence on students' perceptions of their competence.

Second, the connection between affective learning and students' relatedness with their instructors has been found to exist as well. Relatedness is defined as "providing a sense of belongingness and connectedness to the persons, group, or culture disseminating a goal" (Ryan & Deci, 2000, p. 64), which may be reflected in students' relationships with their instructors (Ryan, Stiller, & Lynch, 1994). Knowing that affective learning in the classroom is a function of experiencing positive emotional responses toward a course and an instructor (McCroskey et al., 1985), it makes sense that affective learning should be related to students' relationships with these individuals. In fact, research by Frisby and Martin (2010) supports this conclusion. Banas et al. (2011) agree and, in their review of the literature, note that humor is an affinity-seeking behavior that allows instructors to create meaningful student–teacher relationships. Thus, affective learning may lead to an increase in students' perceptions of relatedness with their instructors.

Third, affective learning and autonomy are also connected. Autonomy represents "individuals' inherent desire to feel volitional and to experience a sense of choice" (Van den Broeck et al., 2010, p. 982) and reflects the notion that people engage in activities that they would want to do naturally (Van den Broeck et al.). In the classroom, this occurs to the extent that students believe they are participating in academic activities they want to be a part of (Fortier et al., 1995). Considering affective learning

encompasses students' positive feelings about their courses, it could be the case that students who enjoy their classes also consider them to reflect experiences they choose to be a part of as opposed to experiences they are forced to engage in. In fact, research supports this position insofar as student attendance has been found to associate with instructors' nonverbal immediacy (Rocca, 2004)—a construct that is highly related to humor (Wanzer & Frymier, 1999) and affective learning (Rodriguez, Plax, & Kearney, 1996). Additionally, as it relates to students' affect toward their instructors, Ryan et al. (1994) argue that the quality of people's connections to other individuals can influence the process of internalization regarding the practices promoted by others. Therefore, having a connection with instructors may result in students having a greater sense of volition in their academic pursuits. Results of their empirical investigation suggest as much: according to Ryan et al. (1994), students who create connections with their instructors report a greater sense of autonomy and control in school.

In summary, we contend that the positive affect generated by humor will impact learning through the fulfillment of students' needs for competence, relatedness, and autonomy. To help test this assertion, we offered the following hypothesis:

> H2: Instructor humor will influence perceived cognitive learning through its impact on affective learning and, subsequently, the fulfillment of students' needs for competence, relatedness, and autonomy.

Finally, staying consistent with the variables in IHPT, we also examined the relationship between humor's impact on students' ability to process information (operationalized as student attention) and their learning. However, though the relationships between affective learning and the needs articulated in self-determination theory are apparent, the same associations between students' attention and their perceptions of competence, relatedness, and autonomy are not. In fact, it is our assertion that this variable will not impact learning by influencing students' basic needs. On the other hand, studies have found that students' attention is related to their enhanced academic performance, cognitive learning (Wei, Wang, & Klausner, 2012), note taking, information recall, and test scores (Kuznekoff & Titsworth, 2013). Thus, it is our contention that students' attention should be related directly to their perceived cognitive learning. To test this prediction, we offered the following hypothesis:

> H3: Instructor humor will influence perceived cognitive learning through its impact on student attention.

Method

Participants

After obtaining approval from the institutional review board, participants were recruited from upper-division communication classes at a large Western university. Participants were 91 men and 208 women (one unreported) with ages ranging from

19 to 50 (M = 22.8, SD = 3.8). Participants were told to think about the instructor from the class previous to data collection and to respond to the items reported below with that individual in mind (Plax, Kearney, McCroskey, & Richmond, 1986); this 10. method has been widely used in instructional communication research to generate data on a variety of instructors and classes.

Instrumentation

Instructor humor. Instructor humor was measured using an adapted version of the humor orientation scale (Booth-Butterfield & Booth-Butterfield, 1991). The scale was adapted by changing the source of successful humorous messages from the individual reporting on the measure to instructors. Consequently, this measure asked students to report on the degree to which their instructors successfully used humor in a course. The measure is 17 items and includes statements such as, "Students would say my teacher is a funny person" and "My teacher uses humor to communicate in a variety of situations" with responses ranging from (1) *strongly disagree* to (5) *strongly agree* (α = .96, M = 3.56, SD = .85). Using the humor orientation scale to measure instructor humor presupposes the first step in IHPT, which necessitates that students recognize instructional messages as humorous.

Affective learning. According to Wanzer et al. (2010), in order for learning to be enhanced, humorous messages must create positive affect because doing so increases students' motivation to elaborate on instructional messages. Thus, similar to the original conceptualization of IHPT, affective learning was selected to represent affect as the variable hypothesized to enhance students' motivation to elaborate on course material. Affective learning was measured using three subscales including students' affect toward the: course content, instructor, and behaviors recommended in the course (McCroskey et al., 1985). The scales were measured using four, seven-step bipolar items anchored with word pairs including "good/bad" and "positive/negative." The measures demonstrated acceptable reliability: course content (α = .90, M = 5.60, SD = 1.41), instructor (α = .92, M = 5.79, SD = 1.44), behaviors recommended in the course (α = .93, M = 5.68, SD = 1.29).

Sustained attention. Considering the original formulation of IHPT equated students' attention with their ability to elaborate on instructional messages (Wanzer et al., 2010), we assessed sustained attention as an indicator of students' ability to elaborately process instructional communication. Sustained attention was assessed using a measure of attention paid to classroom activities, lectures, and discussions (Wei et al., 2012). The scale includes six items with statements such as "I can sustain my attention to learning throughout the class" and "I have difficulty sustaining my attention during the lecture." Response options ranged from (1) *not at all true of me* to (7) *very true of me* (α = .90, M = 4.95, SD = 1.33).

Cognitive engagement. Cognitive elaboration/processing is defined as increased effort expended toward issue relevant thinking (Petty & Cacioppo, 1986a) and has been

measured in a variety of ways (e.g., Petty & Cacioppo, 1986a) including through the solicitation of self-reports (e.g., Cacioppo, Petty, & Morris, 1983; Nabi et al., 2007; Petty, Harkins, & Williams, 1980; Reynolds, 1997). In previous studies using self-report measures, researchers have operationalized cognitive elaboration as cognitive engagement and involvement with a task. For example, the construct has been operationalized as effort expended toward evaluating communication (Cacioppo et al., 1983; Petty et al., 1980), concern with ideas being presented, a focus on messages being communicated (Reynolds, 1997), and involvement in a task (Petty et al., 1980). In line with previous studies using self-report measures then, we used a measure of cognitive engagement in the classroom as a proxy for cognitive elaboration (Miserandino, 1996). This scale contains items such as "When I'm in class, I just act like I'm working" (reverse coded) and "The first time my teacher talks about a new topic I listen very carefully" with response options ranging from (1) *not at all true* to (4) *very true* (α = .88, M = 3.46, SD = .54).

Basic needs. Scales designed to directly measure students' perceived competence, relatedness, and autonomy were not available. Thus, in their absence, variables associated with self-determination were measured with scales selected to represent these constructs. *Competence* is defined as feeling confident in one's abilities regarding effectance in a specific context (Ryan & Deci, 2002) which may be reflected in students' perceptions of their knowledge/expertise in their courses. Thus, competence was assessed with the competence subscale from McCroskey & Teven's (1999) measure of credibility. This scale uses six semantic differentials anchored with words including "informed/uninformed" and "bright/stupid" (α = .95, M = 5.23, SD = 1.37). *Relatedness* refers to feelings of connectedness with others (Ryan & Deci, 2002) and in the classroom refers to students' perceptions of their relationships with their instructors (Ryan & Deci, 2000). In the current study, relatedness was assessed using a measure of instructor–student rapport (Frisby & Martin, 2010). This measure includes 11 items such as "My instructor creates a feeling of 'warmth' in our relationship" and "I have a close relationship with my instructor." Response options ranged from (1) *strongly disagree* to (7) *strongly agree* (α = .97, M = 4.89, SD = 1.53). Autonomy refers to engaging in behaviors people enjoy or value (Ryan & Deci, 2002) and, in the classroom, reflects students' beliefs that they are participating in academic activities they want to be a part of (Fortier et al., 1995). After adapting the items to reflect an academic context, *autonomy* was measured using the six-item subcomponent of Van den Broek et al.'s (2010) work-related basic need satisfaction scale. Items included statements such as "The tasks I have to do in this class are in line with what I really want to do" and "In this class, I feel forced to do things I do not want to do" (reverse coded). Responses were solicited with options ranging from (1) *totally disagree* to (5) *totally agree* (α = .80, M = 3.65, SD = .85).

Perceived cognitive learning. Perceived cognitive learning was measured using a 10-item scale developed by Frisby and Martin (2010). This scale asks students to report their level of agreement on a series of statements relating to their perceptions

of learning in class. Examples include statements such as "My knowledge on this class topic has increased since the beginning of class" and "I can see clear changes in my understanding of this topic" with responses ranging from (1) *strongly disagree* to (5) *strongly agree* (α = .92, M = 3.92, SD = .79).

Results

Hypothesis 1

To test our first hypothesis, we examined a model with humor leading to affective learning and student attention that, in turn, led to perceived cognitive learning through the influence of cognitive engagement (see Table 1, Figure 1). We conducted two analyses to assess the fit of the measurement model and the structural model according to Kline's (2005) two step rule. The first analysis examined a measurement model to ascertain the fit of the observed variables with respect to the proposed latent variables. This model consisted of affective learning predicted by its three subcomponents (i.e., course, instructor, behaviors). Because the use of parcels has several advantages over single items (Coffman & MacCallum, 2005), humor, sustained attention, cognitive engagement, and perceived cognitive learning were represented in our model by three parcels each. Each of the variables (except perceived cognitive learning) was unidimensional and parcels were constructed by randomly assigning items to parcels for their respective variables (Coffman & MacCallum, 2005). Perceived cognitive learning was found to be two-dimensional; parcels for this variable were constructed using facet-representative parceling (Little, Rhemtulla, Gibson, & Schoemann, 2013). Results of a confirmatory factor analysis revealed that the model fit the data relatively well (χ^2 = 188.51, df = 80, $SRMR$ = .04, CFI = .97, $RMSEA$ = .07). Next, we examined the composite model associated with IHPT to determine the fit after including the proposed paths between the latent variables. Based on recommendations from Preacher and Hayes (2008), affective learning and student attention were allowed to correlate. Results revealed that the model did not fit the data well (χ^2 = 390.57, df = 84, $SRMR$ = .09, CFI = .92,

Table 1 Intercorrelations Between Variables

	1	2	3	4	5	6	7	8	9
1. Humor									
2. Aff_Content	.57								
3. Aff_Instructor	.67	.71							
4. Aff_Behaviors	.59	.77	.79						
5. Sustained Attention	.38	.48	.49	.48					
6. Cognitive Engagement	.44	.52	.52	.49	.75				
7. Competence	.52	.69	.68	.68	.49	.52			
8. Relatedness	.70	.64	.80	.70	.48	.47	.68		
9. Autonomy	.54	.72	.68	.68	.46	.46	.65	.69	
10. Cognitive Learning	.62	.77	.76	.71	.54	.62	.70	.73	.72

Note. All correlations are significant at $p < .001$ (one-tailed).

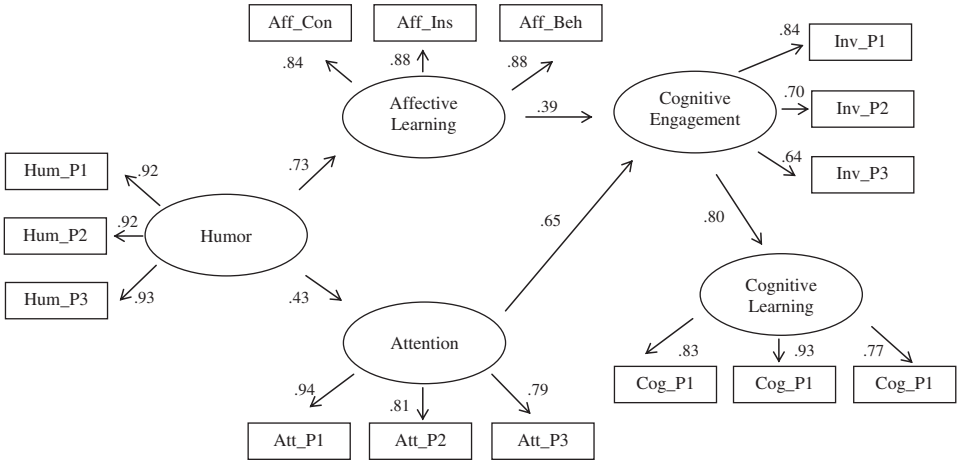

Figure 1 Instructional humor processing theory. All paths are standardized and significant at $p < .01$.

RMSEA = .11). Because composite model fit statistics are influenced by the measurement model (O'Boyle & Williams, 2011), the model RMSEA-P was calculated to determine the fit of the path model alone (i.e., the fit of the model as represented by the associations between the latent variables). For the model represented in Figure 1, the RMSEA-P was .41 indicating a poor fit of the path model to the data.

Hypotheses 2 and 3

Next, to test hypotheses 2 and 3, we examined the self-determination model. This model was represented by humor leading to both affective learning and attention, and with affective learning leading to perceived cognitive learning through the influence of students' needs as articulated by self-determination theory (see Figure 2). Students' sustained attention was modeled to have a direct impact on their perceived cognitive learning. We allowed the error terms of affect toward instructor and the relatedness component of SDT to correlate. These items reflect students' positive experiences with their instructors and therefore it may be reasonable to assume that they share a common cause (McDonald & Ho, 2002). Two analyses were conducted to examine the tenability of this model. First, we examined a measurement model to determine the fit of the observed variables to the latent variables. This model consisted of affective learning predicted by its three subcomponents (i.e., course, instructor, behaviors); self-determination predicted by competence, relatedness, and autonomy; and humor, attention, and perceived cognitive learning predicted by three parcels each. Results of a confirmatory factor analysis revealed that the model fit the data reasonably well (χ^2 = 197.09, *df* = 80, *SRMR* = .03, *CFI* = .97, *RMSEA* = .07). Next, we examined the fit of the composite model (similar to the IHPT model, affective learning and student attention were allowed to correlate). Results revealed that this model also fit the data relatively well (χ^2 = 207.20, *df* = 83, *SRMR* = .04, *CFI* = .97,

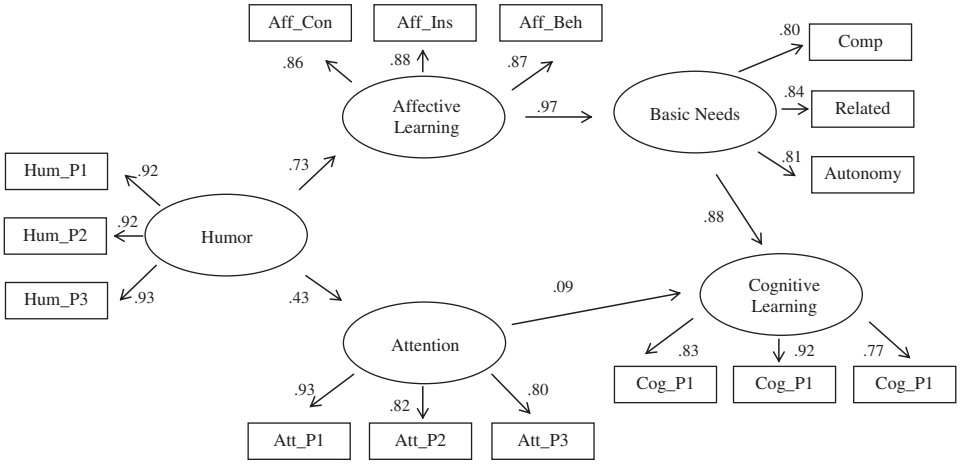

Figure 2 Alternative model: self-determination theory. All paths are standardized and significant at $p < .01$ except the path from Attention to Cognitive Learning, which is significant at $p < .05$. R^2: Affective Learning = .53, Attention = .18, Basic Needs = .95, Cognitive Learning = .88.

RMSEA = .07). Again, because composite model fit statistics are influenced by the measurement model, the model RMSEA-P was calculated to determine the fit of the path model alone. Results indicated that the path model was a reasonable fit to the data (*RMSEA-P* = .07).[1]

To test the specific associations predicted in hypothesis 2, we examined the indirect paths between humor and perceived cognitive learning. Using methods recommended by Macho and Ledermann (2011), analyses were conducted for unstandardized indirect effects with bias-corrected estimates computed from 5,000 bootstrapped samples using a 95% confidence interval. Hypothesis 2 was supported; results indicated that the indirect serial effect of humor on perceived cognitive learning through affective learning and self-determination was significant (*SE* = .04, *CI* = .38 to .54) with a point estimate of .45. On the other hand, hypothesis 3 was not supported; the indirect effect of humor on perceived cognitive learning through attention was not significant (*SE* = .02, *CI* = .00 to .06).

Finally, we tested a model with both theories simultaneously to examine the predictive potential of IHPT as it compared with SDT (see Figure 3). In this model affective learning and attention were allowed to correlate; additionally, self-determination and cognitive engagement were allowed to correlate (Preacher & Hayes, 2008). Results indicated that the model fit the data relatively well (χ^2 = 307.11, *df* = 125, *SRMR* = .04, *CFI* = .96, *RMSEA* = .07, *RMSEA-P* = .06). As can be deduced from the figure, the indirect effect of humor on perceived cognitive learning through IHPT was .06. The indirect effect of humor on perceived cognitive learning through SDT was .60.

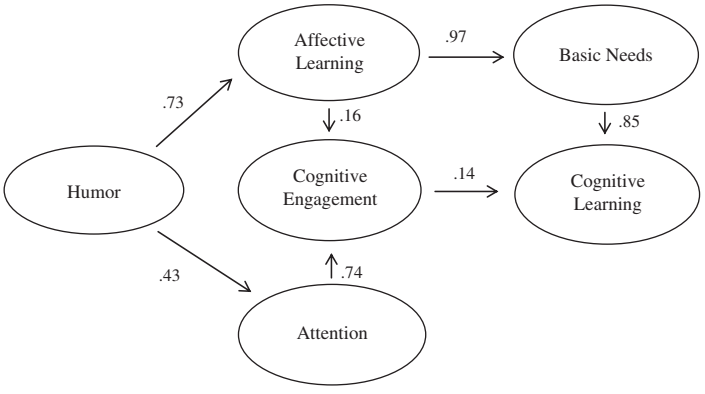

Figure 3 Instructional humor processing theory with self-determination theory. All paths are standardized and significant at $p < .01$. For simplicity, observed variables are not shown. The path between attention and cognitive learning was nonsignificant and trimmed from the model.

Discussion

As an instructional behavior, humor has been reported to enhance student learning (Banas et al., 2011). In the current study, we explored instructional humor processing theory as a mechanism to explain this outcome in an attempt to empirically validate the associations between the variables articulated by the theory. In addition, we explored an alternative explanation for the influence of humor on student learning and made the argument for humor's effectiveness through the fulfillment of students' basic psychological needs according to self-determination theory (Deci & Ryan, 2000). As should be clear from the results of our analyses, IHPT did not adequately explain the impact of humor on students' perceived cognitive learning. Though humor was associated positively with perceived cognitive learning, affective learning, attention, and cognitive engagement, the variables did not work together in a causal model in the manner explicated by Wanzer et al. (2010). In their article, Wanzer et al. (2010; see their Figure 1) noted that for humor to make a positive impact on student learning, it must create positive affect and enhance students' attention if it is to increase students' likelihood of elaborately processing instructional messages; though the paths were all significant and in the right direction, results of our structural regression analysis failed to support the proposed relationships.

As an alternative to IHPT, we explored self-determination theory as an explanatory mechanism linking instructor humor and students' perceived cognitive learning. Admittedly, our second hypothesis was in alignment with IHPT insofar as we agreed with the basic tenets that the resolution of incongruity leads to perceptions of humor and that humor must result in positive affect for it to lead to learning. However, our explanation regarding the impact of humor differs from IHPT in the final stages of the theory where we claimed that positive affect stemming from humor in the form of affective learning ultimately influences perceived cognitive learning through the

fulfillment of students' needs for competence, relatedness, and autonomy. The strength of the paths from humor to perceived cognitive learning in Figure 3 supports this conclusion and demonstrates that SDT was able to account for more variance in students' perceived cognitive learning than IHPT. 25. Though the model in Figure 3 fit the data relatively well, the impact of humor through cognitive engagement was minimal. We retained the SDT model as the best description of the relationship between humor and student learning; our subsequent interpretation of the findings is based on this model.

As was made evident by our mediation analyses, we did not find support for hypothesis 3. Though humor was related to sustained attention and though students' sustained attention was related to their reports of learning, our results indicated that with the fulfillment of students' needs in the model, attention did not significantly mediate the relationship between teacher humor and students' perceived cognitive learning. Thus, as it pertains to the influence of humor, results from our analyses demonstrate that perceived cognitive learning is impacted more through the fulfillment of students' basic needs than it is their sustained attention. Considering sustained attention is linked to students' capacity to store and recall information (Kuznekoff & Titsworth, 2013), these results help us dispute the argument that humor increases learning through its ability to influence students' concentration and information processing capabilities (Wanzer et al., 2010).

As predicted in hypothesis 2, affective learning was associated with perceived cognitive learning through its impact on students' needs as articulated by self-determination theory. These results are consistent with previous research linking positive affective states and the fulfillment of students' needs. For example, as it relates to competence, positive affect has been shown to increase perceived self-efficacy (Baron, 1990). Considering increased perceptions of self-efficacy may lead to enhanced performance (Bandura, 1997), it could be that positive affect increases students' perceptions of competence because students ultimately become better at activities linked to humorous instruction. Alternatively, by using humor and positive affect to increase self-efficacy and competence, instructors may also help promote students' intrinsic interest in subject matter (Bandura, 1997). As a result, students' enhanced intrinsic motivation may lead to increased academic growth through the development of their self-regulative strategies for learning (Pintrich, 1999) and through their increased propensity to study in a deep and strategic manner (Bolkan, Goodboy, & Griffin, 2011). This idea has support from Baron (1990) who demonstrated that positive affect in organizational contexts can enhance the quality of work settings and, subsequently, the performance of individuals therein. Taken together, the results of the studies mentioned above suggest that when engaged in a positive learning environment, students might behave in ways that help them perform better in their courses and may consequently feel more competent.

Affective learning has been shown to associate with students' relationships with their instructors as well. In fact, researchers have shown that affective learning is linked directly to students' positive personal connections and enjoyable interactions with instructors (Frisby & Martin, 2010). In addition, the connection between

affective learning and teacher–student relatedness has support from researchers who claim that humor functions to increase group cohesion and reduce the psychological distance between instructors and students (Banas et al., 2011). Thus, results from the current study are in line with previous research and support the claim that humor in the classroom may function (in part) by creating a positive affective experience that fulfills students' needs to feel connected and enjoy a sense of belonging.

Finally, our data suggest that affective learning resulting from humorous teachers may also help students experience autonomy in the classroom. Considering autonomy is related to the idea that students engage in activities that they would want to do naturally (e.g., Van den Broeck et al., 2010), these findings suggest that humor's ability to increase affective learning may result in an autonomy-promoting academic environment. Results from Goodboy and Bolkan (2009) support this conclusion insofar as affective learning has been shown to increase student motivation operationalized as student interest and excitement for class. Relatedly, humorous teachers may help students enjoy their courses which might make going to class personally rewarding and satisfying (Rocca, 2004). If these classes are rewarding, they should promote a desire to go to class and therefore a sense of personal choice that may help fulfill students' needs for autonomy (Deci & Ryan, 2008).

Lastly, and perhaps most importantly, we found that by fulfilling students' needs, instructors were able to enhance their students' perceived cognitive learning. This finding is in line with what other researchers would predict. For example, as we stated in the literature review, researchers examining the basic needs theory have found that, compared with students who do not have their needs fulfilled, students who do tend to enjoy greater academic achievement, higher grades (Fortier, Vallerand, & Guay, 1995), and increased learning (Guay et al., 2008). This all might occur as a result of self-determined students' increased engagement, enhanced intrinsic motivation (Jang et al., 2009), and increased academic persistence (Guay et al., 2008). Ultimately, then, our results support previous research claiming that self-determination is important in educational settings and make the case that one of the ways teachers may fulfill students' basic psychological needs is by fostering affective learning through humorous communication.

In summary, we propose that the reason humor impacts students' perceived cognitive learning is not through increased cognitive effort or involvement. Instead, we assert that humor's impact on learning stems from the positive climate it builds and, subsequently, the needs it fulfills for students. By fulfilling students' needs, we argue that instructors can promote genuine enthusiasm for learning (Deci et al., 1991) which should lead to academic behaviors that increase students' chances for being successful in their courses. Admittedly, this study was exploratory in nature and did not test some of the underlying mechanisms of IHPT directly (insofar as motivation to process information and information processing were not directly measured). That said, our results should be interpreted in light of the operational shortcomings. However, despite the limitations, we believe the results of this study help start a conversation regarding the possibility that instructor humor is best understood as a behavior that promotes learning through positive affect in a general

sense. In other words, as an exploratory endeavor, this study has utility insofar as it raises the argument that humor may not be beneficial in instructional contexts because it helps students elaborate on course material. Instead, results from this study support the argument that humor may be beneficial because it creates a positive learning environment that fulfills students' needs and promotes behaviors related to learning.

Limitations and Future Directions

As with all studies, this one has its limitations. Despite our findings, caution should be applied when interpreting these results. As most scholars know, the results of one research report may not provide enough evidence to denounce a theory. Having said that, one of the limitations of this study relates to the operationalization of our constructs. For example, we measured the underlying process of elaboration with self-report data. Though the scale we used was operationally consistent with previous self-report measures (e.g., Cacioppo, Petty, & Morris, 1983; Reynolds, 1997), some researchers argue that asking people how much effort they used or how much thinking they engaged in may not accurately reflect elaboration because "people do not always have access to their cognitive processes" (Petty & Cacioppo, 1986a, pp. 136–137). In addition, there have been several problems with measuring elaboration with self-report data including issues regarding model fit (Carpenter & Boster, 2013) and a lack of predictive validity (Petty & Cacioppo, 1986a). Moreover, we used affective learning in this study as a proxy for students' motivation to elaborate on course information. Though this operationalization is consistent with the original formulation of IHPT (which did not measure motivation to elaborate), future researchers may consider measuring motivation to elaborate more directly. The same can be said for cognitive elaboration (which, also, was not measured in the original formulation of IHPT). Thus, future researchers may consider assessing IHPT by measuring the constructs associated with the theory more directly. For example, researchers may decide to measure elaboration through processes including thought-listing or psychophysiological measures (Petty & Cacioppo, 1986a) to determine if positive affective states and attention can induce elaboration and, subsequently, student learning.

Relatedly, though we are confident our measures validly assess the constructs under study, it would be important for future researchers to confirm our conclusions using alternative scales. For example, our measure of learning was operationalized as students' perceptions of their academic growth in their classrooms. Perceived cognitive learning is one way to assess student learning, and future studies may benefit from investigating relationships between humor, self-determination theory, and student success by other means as well. The same could be said for some of the other variables used in this study including student affect, the variables related to students' basic needs, and instructor humor. As it relates to the latter, the current investigation examined instructor humor orientation as a way of capturing students' perceptions related to overall impressions of successful humor. However, the

literature may benefit from an exploration of specific humor messages and their relation with hypothesized mediator variables such as affect, elaboration, and attention. Moreover, the literature would also benefit from the development of a classroom-specific scale to measure the fulfillment of students' basic needs in their coursework. Accordingly, future researchers may consider examining the relationships explored in this study using alternative measures to determine if the variables continue to work together as proposed.

Another limitation concerns our methodology. Although researchers who study structural regression models state that path models "describe relationships of dependency—usually accepted to be in some sense causal—between latent variables" (McDonald & Ho, 2002, p. 65), without specific experimental testing it is difficult to prove causality (Kline, 2005). Thus, future researchers should design experiments to test the relationships hypothesized by IHPT. Specifically, future researchers may consider manipulating instructor humor in the classroom and then testing for student attention (perhaps through note-taking procedures, e.g., Kuznekoff & Titsworth, 2013) to determine if it leads to an increased ability to process information elaborately. In addition, researchers should demonstrate that motivation toward elaboration occurs as the *result* of positive affect stemming from humor as IHPT predicts. To be consistent with the original formulation of IHPT, researchers should next demonstrate that enhanced cognitive elaboration actually occurs as the result of these experiences. However, even if it can be shown that humor leads to increased message elaboration through positive affect and attention in an experimental setting, proponents of IHPT should also: (a) show that this increase in elaboration happens more for participants in an experimental condition compared with a control group and (b) demonstrate a link between increased processing and cognitive learning. Moreover, in alignment with current thinking regarding the effect of humor in the classroom, this should be done for course lessons in general, not for specific messages relating to a portion of a lecture (Banas et al., 2011; Ziv, 1988). As it stands, there is a lot of work to be done to substantiate the tenets of IHPT, and we propose that alternative theories explaining the link between humor and learning (such as SDT) should be also be considered as researchers move forward.

Finally, future researchers should continue to use the classroom to develop and test instructional communication theories (Friedrich, 1989). Historically, instructional communication research has suffered from a dearth of theory (Mottet, Frymier, & Beebe, 2006) and researchers have tested complex and convoluted atheoretical models for the sake of statistical complexity instead of incorporating statistical modeling techniques that test theory (see Floyd, 2014). That said, IHPT is one of the few theories unique to instructional communication, and instructional researchers should continue to explore it. However, we also recommend that communication researchers begin to embrace self-determination theory in order to understand how instructors meet students' basic needs and how the fulfillment of these needs facilitates students' behaviors and, ultimately, learning.

Note

[1] To validate our assumptions regarding the measurement of SDT, we measured intrinsic motivation via the motivated strategies for learning questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991). As predicted, each of the components of SDT correlated positively with intrinsic motivation (Competence $r = .50$, $p < .01$; Relatedness $r = .51$, $p < .01$; Autonomy $r = .50$, $p < .01$).

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